IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appl. No.: 09/732,337 Confirmation No.: 1461
Appellant: Paksoy et al
Filed: 12/07/2000
TC/AU: 2626
Examiner: Abebe

Docket: TI-28759
Cust. No.: 23494

APPEAL BRIEF (reinstated appeal)

Commissioner for Patents
P.O.Box 1450
Alexandria VA 22313-1450

Sir:

The attached sheets contain the Rule 41.37 items of appellant's appeal brief; this brief is pursuant to MPEP 1204.01 (Reinstatement of Appeal). The fee for filing a brief in support of the appeal has previously been paid; but the Director is hereby authorized to charge any other necessary fees to the deposit account of Texas Instruments Incorporated, account No. 20-0668.

Respectfully submitted,

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Rule 41.37(c)(1)(i) Real party of interest

Texas Instruments Incorporated owns the application.

Rule 41.37(c)(1)(ii) Related appeals and interferences

There are no related dispositive appeals or interferences.

Rule 41.37(c)(1)(iii) Status of claims

Pursuant to MPEP 1205.02, for each claim in the case appellant states the status as follows:

Claim 1: rejected
Claim 2: rejected
Claim 3: rejected
Claim 4: rejected
Claim 5: rejected
Claim 6: rejected
Claim 7: rejected
Claim 8: rejected
Claim 9: rejected
Claim 10: allowed
Claim 11: allowed
Claim 12: allowed
Claim 13: allowed
Claim 14: allowed
Claim 15: allowed
Claim 16: rejected
Claim 17: rejected
Claim 18: rejected
Claim 19: rejected
Claim 20: rejected

Pursuant to MPEP 1205.02, appellant identifies each claim on appeal as follows

Claim 1: on appeal

Claim 2: on appeal
Claim 3: on appeal
Claim 4: on appeal
Claim 5: on appeal
Claim 6: on appeal
Claim 7: on appeal
Claim 8: on appeal
Claim 9: on appeal
Claim 16: on appeal
Claim 17: on appeal
Claim 18: on appeal
Claim 19: on appeal
Claim 20: on appeal

Rule 41.37(c)(1)(iv) Status of amendments

There is no amendment after final rejection.

Rule 41.37(c)(1)(v) Summary of claimed subject matter

The independent claims on appeal consist of encoder claim 1 and decoder claim 16,

The subject matter of claim 1 is a wide band signal coder with a means for subdividing signals over a bandwidth into a lower subband and a higher subband signals (FIG. 1 upper two branches; application page 2, lines 25-30 and page 3, lines 7-8), a downsampler for downsampling said lower subband signals, (FIG. 1 upsample 13 plus LPF 15 plus downsample 17; application page 2, lines 27-30), said downsampling by a factor of n/m where n and m are both integers greater than 1 (FIG. 1, upsample 13 by factor 2 and downsamle 17 by factor 3 for overall factor of 2/3), a low band speech coder coupled to said downsampler for encoding said downsampled lower subband signals (FIG. 1 CELP 18; application page 3, lines 1-6), and a highband coder for coding said higher subband signal without downsampling (FIG. 1 high band coder 20; application page 3, lines 12-

14), and a combiner for combining said higher and lower subband signals (FIG. 1 tranmission; application page 3, line 15).

The subject matter of claim 16 is a wideband speech decoder system with a first decoder for decoding encoded lower subband signals (FIG. 1, CELP 21; application page 3, lines 16-18), a second highband decoder for decoding higher subband signals at a higher sampling rate than said lower subband signals (FIG. 1, high band decoder 27; application page 3, lines 20-22), a converter for converting said lower subband signals to the same sampling rate as the higher band signals (FIG. 1, upsample 23 plus LPF 25 plus downsample 26; application page 3, lines ), said converting by a factor of m/n where n and m are both integers greater than 1 (FIG. 1, upsample 23 by factor 3 and downsamle 26 by factor 2 for overall factor of 3/2); and an adder for summing said lower subband signals and said higher subband signals (FIG. 1, adder 30; application page 3, lines 25-26).

More explicitly, application FIG.1 and pages 2-3 describe both the speech encoder and decoder with an example of a wide band speech signal (50 to 7000 Hz frequency band sampled at 16 kHz). The frequency band is split into a 0 to 5333 Hz lower subband and a 5333 to 7000 Hz higher subband (with a filter transition 5000 to 5333 Hz). The initial sampling rate is 16 kHz, and the lower subband is extracted and downsampled by a factor of 2/3 with the steps of interpolation by 2 (increases the sampling rate to 32 kHz), lowpass filter (extract lower subband and precludes aliasing), and decimation by 3 (decreases the sampling rate to 10.67 kHz). The higher subband is extracted with a bandpass filter (5333 to 7000 Hz) and maintains the 16 kHz sampling rate. The downsampled lower subband speech is encoded with a standard narrowband speech encoder, such as a CELP coder (claim 4), and the higher subband speech is encoded with any of several possibilities (claims 5-9), such as noise-excited LP. After transmission together, the encoded lower subband speech and the higher subband speech are separately decoded and recombined to synthesize the wide band speech.

Rule 41.37(c)(1)(vi) Grounds of rejection to be reviewed on appeal

The grounds of rejection to be reviewed on appeal are:

Claims 1-9 and 16-20 were rejected under 35 USC § 103(a) as unpatentable over Iwamura et al. (5,914,752) in view of Kawahara (6,697,775).

Rule 41.37(c)(1)(vii) Arguments

Claims 1-9 and 16-20 were rejected under 35 USC § 103(a) as unpatentable over Iwamura et al. (5,914,752) in view of Kawahara (6,697,775).

Claims 1-9: The references do not suggest either of the claim 1 requirements of: (1) subdividing signals into a lower subband and a higher subband without downsampling the higher subband and (2) a downsampling of the lower subband by a factor of n/m with n and m both greater than 1 as follows.

(1) The Examiner cited Iwamura FIG.2 signal G as the lower subband and differential signal H as the higher subband, noting column 6, lines 20-30. However, Iwamura further describes differential signal H in column 7, line 61 through column 8, line 25 as having the same data amount (i.e., bandwidth) as the original signal and (FIG. 6C) being split into high and low frequencies for downsampling and coding. In fact, Iwamura FIG. 2 shows that the lower subband is actually signal B (which is then downsampled and quantized to give signal D), and that signal G is a reconstruction (upsample and requantization) of signal D to approximate signal B. Indeed, FIG. 5B shows the spectrum of signal H with small amplitude for lower frequencies, but not 0, because G only approximates the lower subband. Note that Iwamura FIG. 7 (prior art) shows the usual dividing into lower subband and higher subband, but with both subbands downsampled.

(2) The Examiner noted that Iwamura has a lower subband downsampling by a factor of 2 and does not explicitly or implicitly prohibit other downsampling factors. But conversely, Iwamura does not suggest any downsampling factor other than 2; and what Iwamura does suggest is pertinent, not what Iwamura does not prohibit. Indeed, Iwamura only suggests halfband filtering with the accompanying critical downsampling by a factor of 2; see FIG. 4A through FIG.

5B. Thus Iwamura does not suggest the claim 1 requirement that the lower subband signal be downsampled by a factor of n/m where both n and m are integers greater than 1; that is, the downsampling factor is neither an integer nor the reciprocal of an integer.

Claims 16-20: The references do not suggest the claim 16 requirement of a converter for converting the lower subband signals sampling rate by a factor of m/n with n and m both integers greater than 1. In particular, the Examiner noted that the decoder of claims 16-20 correspond to the encoder of claims 1-9 and thus cited the foregoing rejection (Iwamura). Consequently, appellant repeats the argument that Iwamura does not suggest any sampling rate factor other than 2; and what Iwamura does suggest is pertinent, not what Iwamura does not prohibit.

Rule 41.37(c)(1)(viii) Claims appendix

1. A wide band signal coder comprising:

means for subdividing signals over a bandwidth into a lower subband and a higher subband signals,

a downsampler for downsampling said lower subband signals, said downsampling by a factor of n/m where n and m are both integers greater than 1,

a low band speech coder coupled to said downsampler for encoding said downsampled lower subband signals, and

a highband coder for coding said higher subband signal without downsampling, and

a combiner for combining said higher and lower subband signals.

2. The coder of Claim 1, wherein said combiner includes a bandpass filter coupled to said highband coder to bandpass said higher subband signal to complement the lower subband.

3. The coder of Claim 1, wherein said combiner includes upsampling said encoded lower subband signals.

4. The coder of Claim 1, wherein said low band speech coder is a CELP coder.

5. The coder of Claim 1, wherein said highband coder is an LPC coder.

6. The coder of Claim 1, wherein said highband coder is random noise.

7. The coder of Claim 1, wherein said highband coder is noise excited LPC.

8. The coder of Claim 1, wherein said highband coder is gain-matched analysis by synthesis.

9. The coder of Claim 1, wherein said highband coder is multi-pulse coding.

16. A wideband speech decoder system comprising:

a first decoder for decoding encoded lower subband signals;

a second highband decoder for decoding higher subband signals at a higher sampling rate than said lower subband signals;

a converter for converting said lower subband signals to the same sampling rate as the higher band signals, said converting by a factor of m/n where n and m are both integers greater than 1; and

an adder for summing said lower subband signals and said higher subband signals.

17. The decoder system of Claim 16, wherein said second decoder includes a gain-scaled random noise generator.

18. The decoder system of Claim 16, wherein said second decoder includes a gain-scaled random noise generator and the output applied to an LPC synthesis filter.

19. The decoder system of Claim 16, wherein said second decoder includes a codebook with allowable excitation vectors, a multiplier and an LPC filter.

20. The decoder system of Claim 16, wherein said second decoder includes a multipulse waveform that is gain-scaled and filtered by an LPC synthesis filter.

Rule 41.37(c)(1)(ix) Evidence appendix

none

Rule 41.37(c)(1)(x) Related proceedings appendix

none